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Chlorinated Hydrocarbon Residues in Fish from Major Waters of Wisconsin

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ABSTRACT

Fish samples collected from six major waters in Wisconsin between 1973 and 1975 were analyzed for chlorinated hydrocarbon residues. Waters sampled were the Mississippi River, Lake Michigan, Lake Wisconsin, Lake Winnebago, Fox River and Rock River. Determinations of residue levels of PCB's, DDD, DDE and DDT were made for all waters except Lake Wisconsin where PCB's and mercury levels were determined. In addition, Dieldrin determinations were made for all sampled waters except Lake Wisconsin and the Mississippi River.

Residue levels are provided for individual fish from each water sampled. Procedures are discussed and recommendations concerning future monitoring and action are outlined. All of the fish sampled were found to contain chlorinated hydrocarbon residues. Lake Winnebago fish had the lowest residue levels but all other waters were found to contain fish with residue levels far above FDA standards.

INTRODUCTION

During the past several years, the Wisconsin Department of Natural Resources has conducted surveys to determine the levels of chlorinated hydrocarbon residues in fish. Samples were collected from selected inland lakes and streams and from areas of the boundary waters, (Kleinert et al., 1968; Poff and Degurse, 1970; Degurse and Ruhland, 1972). During 1973 and 1974, these surveys were continued by the Fish Management Section at a limited level. The purpose of this effort was to provide data on the residue levels of contaminants of fish from the major waters of the state. The waters selected were those known or suspected to have relatively high chlorinated hydrocarbon contamination and very active sport and commercial fisheries.

Almost all data presented in this report have been provided to personnel of this Department as soon as analyses of sample segments were completed. These data, along with data obtained from other Bureaus and Departments, have been used as a basis for action or the development of plans for action.

With this in mind, we recognize that this report is a presentation of descriptive data much of which will not add new information. However, we believe it is essential that this data be regrouped and presented with the procedures used to obtain them to clarify the results and avoid misinterpretations.

PROCEDURES AND DISCUSSION OF PROCEDURES

The collection and preparation of fish samples has been described previously (Degurse and Ruhland, 1972). Samples were collected from the Upper Mississippi River, Lake Michigan, Lake Wisconsin on the Wisconsin River, Lake Winnebago, Fox River and Rock River. Laboratory procedures were esentially unchanged from those used previously with the exception of standards for polychlorinated biphenyls (PCB's). Technical standards made up of Aroclor® (Monsanto) were used when the "best fit" could be obtained with these. Aroclor® 1248 and 1254 were the technical standards found to be the "best fit" in comparing PCB residues in many of the samples. This condition of residues was noted previously (Degurse and Ruhland, 1972), and by workers at the State Department of Agriculture Laboratory (Daubert, 1975). However, many samples contained PCB levels which were considerably different in combination of isomers from those of any of the Aroclors®. These samples were quantitated by comparison to standards made up by fractions of technical material (Aroclor® 1248, 1254, 1260). These fractions were obtained by collection of "peaks" eluting from a preparatory column. Use was made of a gas liquid column six feet by 8 mm, packed with a mixed bed of DC 200 Qf-1 9 to 5 on gas chrom Q. Columns were held at 200° C. The detector used was hydrogen flame ionization. An effluent splitter with a ratio of 1 to 10 was provided. Collection was made in capillary tubes at room temperature. Fractions were removed from the collector tubes with hexane and evaporated on previously weighed aluminum pans. A micro balance was used for

weighing pans and fractions from the preparatory column. Each fraction was injected upon the analytical column and retention time determined. Twelve fractions were used to make up a standard mixture. This provided a standard wherein the weight of individual peaks was known.

Since it appears that more than one isomer of polychlorinated biphenyl can exist in many of the fractions eluting from a gas liquid column, unknown peaks may not contain the same mass relationship as do standards. Therefore, the procedure using fractional standards does not remove all the quantitative error. However, fractional standards are the best choice when "weathering", differential absorption, or recycling has taken place in the environment because technical standards cannot accurately be used. In these conditions, we have seen a shift toward later eluting, more highly chlorinated isomers. Standards made from technical material are the best choice when contamination is of a relatively recent occurrence and of a specific compound mixture. In many samples, Arochlor® 1248 and 1254 could be used as standards.

During all analyses the best fit of unknowns was made either to 1248, 1254 or standards made of fractions from technical material. Amounts of PCB's were reported as such without regard to type of standard used. All chlorinated hydrocarbon concentrations are reported on a wet fish basis and determined from an analysis of whole fish after removal of the viscera, head, and caudal fin.

FINDINGS

Mississippi River

Pesticide residues in fish from the Mississippi River (Table 1) were again found to be very low. Levels of PCB's were found to range somewhat lower than those found in the 1972 survey of this river (Table 1). Sample variations may account for some of this difference. Reports, unpublished by the State Department of Agriculture indicate residue levels up to 56 ppm in carp from Lake Pepin in the spring of 1975. Here again, sampling variation may account for this variation from 1972 and 1973. With such limited data, one must conclude, at best, that there is no real trend downward.

Residues of PCB's in the fish from Lake Pepin and downstream to Alma are most nearly comparable to Aroclor® 1254. Downstream samples are best compared with standards of peaks eluting later than DDE. This "weathering" was noted previously and appears to remain constant.

Lake Michigan

Fish from Lake Michigan (Table 2) continue to contain significant residues of DDT and DDT analogs. However, only the larger lake trout were found to range above the 5 ppm action level established for this pesticide. Dieldrin remains a significant residue in the larger white fish. Residues of PCB's are extremely variable between specimens of high grade commercial value. Large carp from Little Sturgeon Bay were found to exceed the action level of 5 ppm PCB's throughout the entire sample.

Residues of PCB's in fish from Lake Michigan proper appear to be made up of "weathered" mixtures of this material. Samples from Little Sturgeon Bay contained residues almost identical to Aroclor® 1248. When very high levels are found in Lake Michigan fish, Aroclor® 1254 can be used as a standard with very little variation from the results obtained using a fractional standard.

Lake Wisconsin

Lake Wisconsin (Table 3) fish contained residues of PCB's relatively lower than expected. Only carp and buffalo were sampled. However, these fish were sampled by selecting fish eight pounds and over, and should represent the higher levels. One would expect smaller game fish specimens to range below the levels found in these large "rough" fish.

Mercury levels were determined in these fish and are here reported without comment on trends due to lack of data on previous samples from this site. Earlier surveys (Kleinert and Degurse, 1972), were extensive along this river system. The mercury levels determined in these Lake Wisconsin fish place them of questionable value as commercial fish.

Lake Winnebago and Fox River

Lake Winnebago sheepshead (Table 4) were found to range very low in chlorinated hydrocarbon residues. Lake Winnebago receives flow from the Upper Fox River (Table 5) which contains fish highly contaminated with PCB's. The area of high contamination is far above Lake Winnebago. The highly contaminated fish were collected from the Fox River just below Portage. The residue in Fox River fish was found to be a perfect match for Aroclor® 1248. Lake Winnebago fish contain PCB residues of a highly "weathered" condition. Downstream samples from the Fox River demonstrate a very rapid drop in PCB residues.

Rock River

Rock River buffalo (Table 6) were found to be lower in PCB's but higher in DDT and analogs of DDT than fish from the other river systems sampled. Residues of PCB's appeared very similar to Aroclor® 1254, but some "weathering" or addition of more highly chlorinated mixtures was evidenced.

CONCLUSIONS

The major water systems of Wisconsin sampled during the past two years were found to contain fish all of which were contaminated by chlorinated hydrocarbon residue. Lake Superior was not sampled, and Lake Winnebago fish were found to be "relatively" safe for food under FDA standards. All other major waters would be suspect or definitely contain fish with residue far above FDA standards. One could only conclude from this that the significantly productive waters of the state have been lost as a commercial fishery. This loss can only, presently,

be attributed to the level of chlorinated hydrocarbons contaminating these fish and the human health aspect of these contaminants. We are aware that these conclusions are expressed "after the fact" but repeat our introduction that this and other data have been available "before the fact".

RECOMMENDATIONS

There is need to continue monitoring conditions of chemical residues in fish from the major waters of Wisconsin. Sampling should be made of selected specimens and these samples should be stratified to age, size and sex. Specific sampling sites and seasons for sampling should be determined and adhered to. The random selection method used in the past may well point to ranges of residue levels, but it would need to be very extensive to be used to determine trends.

Sampling of fish by this Division should be done only for invetigation upon the effects these contaminants have upon fish as such. Residue analysis in fish monitoring should be a part of the environmental protection monitoring program and correlated with the discharge monitoring and permit system of that Division.

The action demanded, in view of the effects on the fishery program involved, can lead us to recommend only that PCB's be placed on the list of highly dangerous materials and their use be permitted only where environmental contamination is entirely prevented. We recommend further that all discharge of PCB's directly into surface waters be stopped regardless of the conditions of material used or the source. Effluent standards above zero must be based upon experimental results indicating that a higher level is tolerable.

It is further recommended that upon review of human health problems pertaining to the consumption of fish contaminated by industrial and agricultural chemicals that this Department examine its management activities in contaminated waters to minimize health hazards.

Methods used in laboratory analyses will always be questioned. We therefore recommend that specific standards be used along with technical standards. It is also recommended that the Perchlorination procedure of Armour be used (Armour, 1973). This procedure has recently been shown to convert eighty-five percent of residue PCB's in fish to Deca-Chloro-Biphenyl (Daubert, 1975).

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APPENDIX

CHLORINATED HYDROCARBON RESIDUE LEVELS FOR SIX WISCONSIN WATERS

All residue levels are reported in parts per million (ppm). Current action levels established by the FDA for each group are as follows:

PCB's 5.0 ppm	Dieldrin 0.3 ppm
*TOTAL DDT 5.0 ppm	Mercury 0.5 ppm

*Total DDT = DDT+DDD+DDE

TABLE 1. CHLORINATED HYDROCARBONS IN MISSISSIPPI RIVER FISH, 1973.

STATION: PEPIN

Sample Number	Species	Length (Inches)	%HOH	%FAT	PCB	DDE	DDD	DDT	Total DDT
54	Walleye	20.3	70.9	6.15	31.4	.656	.431	.056	1.14
55	Walleye	20.1	70.5	5.83	14.3	.344	.232	.012	.588
56	Walleye	19.9	73.7	3.10	25.7	.563	.304	.024	.891
57	Walleye	17.0	70.7	6.06	12.2	.313	.190	.007	.510
58	Walleye	16.9	70.6	8.12	11.9	.250	.185	.001	.435
59	Walleye	19.4	71.2	6.06	28.2	.531	.397	.059	.987
60	Walleye	23.2	72.6	4.71	29.3	.594	.212	.018	.824
	Average				21.9	.464	.279	.025	.768
61	Smallmouth Bass	10.4	74.2	2.35	4.48	.153	.098	.015	.266
66	Smallmouth Bass	17.3	72.4	1.84	5.84	.130	.073	.011	.214
	Average				5.16	.142	.086	.013	.240
62	Largemouth Bass	12.0	74.6	2.28	3.89	.177	.060	.006	.243
63	Largemouth Bass	13.0	75.8	1.59	3.57	.201	.069	.009	.279
64	Largemouth Bass	14.0	74.0	0.91	1.65	.032	.020	.003	.055
65	Largemouth Bass	16.2	74.3	0.60	10.5	.236	.121	.013	.370
	Average				4.90	.162	.068	.008	.237
67	Northern Pike	11.0	77.3	0.17	0.94	.027	.008	.002	.037
68	Northern Pike	16.7	77.8	0.08	1.01	.032	.011	.002	.045
	Average				.975	.030	.010	.002	.041
69	Northern Redhorse	17.3	73.6	3.34	3.99	.053	.025	.009	.087
70	Northern Redhorse	16.4	75.6	1.18	8.53	.167	.068	.032	.267
71	Northern Redhorse	15.4	66.1	11.9	6.17	.104	.058	.015	.177
72	Northern Redhorse	16.8	74.9	1.44	7.84	.167	.036	.017	.220
74	Northern Redhorse	15.5	69.1	7.96	3.45	.060	.030	.015	.105
75	Northern Redhorse	15.2	74.6	0.62	4.75	.077	.034	.018	.129
76	Northern Redhorse	16.1	73.0	2.87	6.87	.141	.032	.008	.181
	Average				5.94	.110	.040	.016	.167
77	Carp	20.5	71.4	7.98	8.06	.288	.182	<.001	.470
78	Carp	20.1	63.5	14.1	7.44	.179	.151	<.001	.330
79	Carp	20.4	64.3	15.5	11.2	.227	.159	<.001	.386
80	Carp	20.0	67.9	12.2	5.94	.127	.126	<.001	.253
81	Carp	20.5	65.1	13.7	8.11	.313	.200	<.001	.513
82	Carp	18.3	65.5	13.0	7.59	.180	.138	<.001	.318
83	Carp	19.5	68.0	11.4	5.49	.107	.150	<.001	.257
	Average				7.69	.203	.158	<.001	.361

Sample Number	Species	Length (Inches)	%HOH	%FAT	PCB	DDE	DDD	DDT	Total DDT
				STATION: PRESCOTT					
84	Northern Pike	15.0	73.1	2.89	4.29	.153	.162	<.001	.315
85	Northern Pike	30.6	72.4	5.69	6.46	.187	.250	.004	.441
	Average				5.38	.170	.206	.002	.378
86	Walleye	15.1	73.7	3.47	11.1	.223	.213	.021	.457
87	Walleye	16.5	69.6	7.47	9.23	.223	.205	.021	.449
88	Walleye	16.8	69.8	8.05	9.01	.208	.221	.021	.450
89	Walleye	18.3	67.3	10.6	8.64	.197	.213	.032	.442
90	Walleye	20.2	63.8	15.0	7.21	.185	.205	.032	.422
	Average				9.04	.207	.211	.025	.444
91	Smallmouth Bass	11.4	75.4	2.00	3.67	.082	.062	.008	.152
92	Smallmouth Bass	10.7	78.7	0.75	3.19	.066	.059	.008	.133
93	Smallmouth Bass	10.2	76.0	0.79	10.5	.097	.049	.008	.154
94	Smallmouth Bass	10.4	78.0	0.18	3.97	.079	.062	<.001	.141
95	Smallmouth Bass	10.2	74.6	0.78	4.37	.101	.085	<.001	.186
96	Smallmouth Bass	10.2	76.1	0.57	2.86	.074	.061	.004	.139
97	Smallmouth Bass	10.2	76.7	0.17	3.35	.074	.052	<.001	.126
98	Smallmouth Bass	9.7	76.9	0.14	4.06	.074	.055	.004	.133
99	Smallmouth Bass	9.2	76.7	0.41	3.74	.087	.170	<.001	.257
100	Smallmouth Bass	8.9	76.4	0.28	9.98	.001	.260	<.001	.260
	Average				4.97	.074	.092	.004	.168
101	Sauger	10.8	75.4	2.87	9.72	.260	.130	<.001	.390
	Average				9.72	.260	.130	<.001	.390
102	Northern Redhorse	15.3	73.7	1.85	16.2	.390	.170	<.001	.560
103	Northern Redhorse	15.0	75.0	0.28	1.01	.038	.014	<.001	.052
104	Northern Redhorse	14.7	73.2	1.23	3.85	.124	.070	<.001	.194
105	Northern Redhorse	14.8	74.4	0.52	1.92	.100	.036	<.001	.136
106	Northern Redhorse	14.7	76.4	0.17	5.88	.129	.044	<.001	.173
107	Northern Redhorse	12.0	76.3	0.76	5.39	.147	.074	<.001	.221
	Average				5.71	.155	.068	<.001	.223
108	Carp	16.4	66.5	13.50	10.37	.454	.240	<.001	.694
109	Carp	19.5	68.8	8.97	5.10	.223	.120	<.001	.343
110	Carp	19.9	72.4	5.83	20.44	.977	.440	<.001	1.42
111	Carp	21.5	77.7	0.41	0.57	.043	.115	<.001	.158
112	Carp	19.5	74.4	4.58	3.99	.569	.029	<.001	.598
113	Carp	18.7	65.6	11.6	8.09	.404	.173	<.001	.577
114	Carp	16.2	71.5	4.35	2.84	.213	.087	<.001	.300
115	Carp	15.6	67.1	12.8	15.5	.766	.192	<.001	.958
	Average				8.36	.456	.174	<.001	.631
				STATION: WABASHA					
116	Walleye	11.5	76.2	1.70	3.84	.235	.035	<.001	.270
118	Walleye	13.2	74.3	1.86	9.00	.318	.075	<.001	.393
119	Walleye	13.8	72.8	4.01	6.68	.297	.092	<.001	.389
120	Walleye	12.5	74.0	2.41	5.75	.277	.025	<.001	.302
121	Walleye	12.5	73.8	2.34	3.99	.256	.066	<.001	.322
	Average				5.85	.277	.059	<.001	.335

Sample Number	Species	Length (Inches)	%MOH	%FAT	PCB	DDE	DDD	DDT	Total DDT
117	Sauger	13.0	73.5	3.03	13.0	.564	.150	<.001	.714
122	Sauger	9.5	75.9	1.86	4.28	.180	.045	<.001	.225
	Average				8.64	.372	.098	<.001	.470
123	Smallmouth Bass	8.7	75.3	0.74	3.65	.165	.035	<.001	.200
124	Smallmouth Bass	11.2	74.1	1.57	4.70	.205	.060	<.001	.265
125	Smallmouth Bass	12.0	75.0	0.95	6.26	.286	.080	<.001	.366
126	Smallmouth Bass	11.9	75.9	0.62	8.19	.310	.068	<.001	.378
127	Smallmouth Bass	12.5	74.1	1.19	6.70	.333	.085	<.001	.418
128	Smallmouth Bass	12.3	74.3	0.70	6.30	.233	.091	<.001	.324
129	Smallmouth Bass	10.5	74.5	1.03	7.36	.430	.119	<.001	.549
130	Smallmouth Bass	9.0	76.2	1.01	5.35	.314	.085	<.001	.399
	Average				6.06	.284	.078	<.001	.362
131	Northern Pike	12.7	76.6	0.52	2.65	.156	.043	<.001	.199
132	Northern Pike	11.3	77.7	0.68	1.60	.125	.027	<.001	.152
133	Northern Pike	9.6	76.8	0.31	3.57	.188	.038	<.001	.226
134	Northern Pike	9.4	78.2	0.41	3.07	.177	.049	<.001	.226
135	Northern Pike	8.5	77.3	0.74	4.54	.229	.049	<.001	.278
	Average				3.09	.175	.041	<.001	.216
136	Northern Redhorse	15.1	67.3	10.3	8.03	.375	.130	<.001	.505
137	Northern Redhorse	13.4	70.4	6.77	3.75	.170	.054	<.001	.224
138	Northern Redhorse	18.0	72.8	2.17	7.92	.375	.125	<.001	.500
	Average				6.75	.307	.103	<.001	.410
139	Golden Redhorse	15.8	71.9	5.29	9.04	.470	.154	<.001	.624
140	Golden Redhorse	14.9	69.9	7.11	3.76	.152	.049	<.001	.201
141A	Golden Redhorse	20.5	76.2	1.07	3.09	.142	.069	<.001	.211
	Average				5.30	.255	.091	<.001	.345
141B	Carp	21.8	66.3	11.3	6.99	.313	.125	<.001	.438
142	Carp	19.0	63.4	16.4	8.61	.375	.163	<.001	.538
143	Carp	21.0	64.1	13.1	9.72	.381	.169	<.001	.550
144	Carp	19.3	65.9	13.1	8.03	.335	.113	<.001	.448
145	Carp	17.0	66.2	12.0	4.31	.303	.156	<.001	.459
146	Carp	17.8	62.8	16.4	10.5	.436	.131	<.001	.567
147	Carp	18.4	72.4	5.29	6.62	.550	.101	<.001	.651
	Average				7.83	.385	.137	<.001	.522
	STATION: ALMA, RIVER MILE 751								
30	Largemouth Bass	19.2	73.2	3.45	3.88	.079	.069	.019	.167
31	Smallmouth Bass	13.5	74.6	2.07	5.84	.051	.050	.017	.118
43	Smallmouth Bass	8.9	72.5	0.34	3.59	.055	.037	.023	.115
44	Smallmouth Bass	16.2	74.9	2.86	13.1	.168	.075	.022	.265
	Average				7.51	.091	.054	.021	.166

Sample Number	Species	Length (Inches)	%HOH	%FAT	PCB	DDE	DDD	DDT	Total DDT
32	Walleye	11.2	74.7	1.54	4.06	.065	.039	.022	.126
45	Walleye	11.1	76.2	1.45	4.77	.081	.050	.013	.144
	Average				4.42	.073	.044	.018	.135
33	Northern Pike	14.3	74.3	1.03	3.10	.050	.031	.011	.092
41	Northern Pike	19.1	78.8	0.22	.62	.009	.006	.005	.020
42	Northern Pike	15.0	76.2	0.27	1.92	.066	.017	.007	.090
	Average				1.88	.042	.018	.008	.067
	STATION:ALMA, RIVER MILE 752								
34	Northern Redhorse	15.2	76.5	1.47	1.68	.021	.018	.008	.047
35	Silver Redhorse	19.3	75.9	2.88	5.77	.058	.068	.025	.151
36	Silver Redhorse	18.2	74.7	0.73	2.93	.025	.022	.009	.056
37	Northern Redhorse	16.2	74.1	3.11	8.02	.046	.043	.032	.121
38	Northern Redhorse	16.1	75.1	1.06	6.82	.118	.027	.028	.173
39	Northern Redhorse	16.9	76.0	0.82	4.91	.056	.047	.025	.128
40	Silver Redhorse	14.6	74.5	1.49	4.03	.050	.031	.016	.097
	Average				4.88	.053	.037	.020	.110
46	Carp	27.1	70.8	4.07	4.51	.137	.065	<.001	.202
47	Carp	24.0	71.1	3.47	3.07	.058	.050	.005	.113
48	Carp	20.1	62.9	14.5	15.8	.361	.318	.014	.693
49	Carp	23.0	67.7	5.63	5.48	.153	.126	.007	.286
50	Carp	18.4	69.5	7.47	4.61	.121	.074	.005	.200
51	Carp	21.1	63.0	15.6	14.6	.489	.382	.019	.890
52	Carp	20.3	63.1	12.3	6.16	.111	.145	.038	.284
53	Carp	20.1	67.3	11.9	11.0	.307	.265	.033	.605
	Average				8.15	.217	.178	.015	.409
	STATION:TREMPEALEAU, RIVER MILE 712-714								
1	Walleye	12.4	74.8	1.08	6.34	.083	.037	.009	.129
2	Walleye	12.8	74.7	1.59	3.16	.053	.016	.005	.074
3	Walleye	13.4	71.8	4.64	5.23	.091	.050	.012	.153
4	Walleye	17.2	75.6	3.57	5.20	.076	.073	.025	.174
	Average				4.98	.076	.044	.013	.132
5	Carp	21.8	64.5	13.6	2.65	.132	.080	.009	.221
6	Carp	19.0	72.9	2.80	2.43	.056	.016	.003	.075
7	Carp	19.7	69.4	6.52	2.03	.052	.026	.007	.085
8	Carp	23.2	67.1	9.67	2.07	.038	.033	.005	.076
9	Carp	25.4	65.3	9.39	1.62	.046	.037	.007	.090
10	Carp	18.8	71.8	4.13	1.16	.007	.019	.005	.031
11	Carp	19.0	68.7	11.8	6.20	.037	.103	.011	.151
12	Carp	17.8	68.4	7.89	1.83	.016	.026	.005	.047
	Average				2.50	.048	.042	.006	.097

Sample Number	Species	Length (Inches)	%HOH	%FAT	PCB	DDE	DDD	DDT	Total DDT
13	Northern Pike	26.0	76.8	1.76	3.09	.047	.053	<.001	.100
14	Northern Pike	27.8	73.5	4.54	5.78	.055	.043	<.001	.098
15	Northern Pike	17.2	76.9	1.03	1.39	.023	.021	.013	.057
16	Northern Pike	16.9	77.4	0.50	0.91	.016	.009	.005	.030
17	Northern Pike	20.1	77.1	0.38	1.30	.025	.019	.026	.070
	Average				2.49	.033	.029	.009	.071
18	Largemouth Bass	10.2	76.2	0.716	2.19	.031	.021	.010	.062
19	Largemouth Bass	12.2	74.4	2.95	2.59	.035	.023	.005	.063
20	Largemouth Bass	11.3	76.5	1.43	1.74	.024	.014	.002	.040
21	Largemouth Bass	12.2	77.4	1.44	2.66	.026	.021	.005	.052
22	Largemouth Bass	12.3	75.8	1.28	2.52	.031	.025	.005	.061
23	Largemouth Bass	15.8	73.5	2.53	5.92	.076	.063	.011	.150
	Average				2.94	.037	.028	.006	.071
24	Northern Redhorse	14.2	72.5	4.88	3.98	.019	.057	.009	.085
25	Northern Redhorse	18.3	75.6	1.22	5.17	.068	.059	.031	.158
26	Northern Redhorse	16.0	71.8	5.31	4.80	.034	.055	.012	.101
27	Northern Redhorse	14.6	75.9	1.59	5.80	.013	.058	.011	.082
28	Silver Redhorse	16.2	72.4	5.72	3.04	.009	.039	.015	.063
29	Golden Redhorse	23.1	76.3	2.58	5.25	.037	.081	.032	.150
	Average				4.67	.030	.058	.018	.106
	STATION: LA CROSSE								
148	Smallmouth Bass	10.5	78.5	0.28	2.04	.151	.042	<.001	.193
149	Northern Pike	13.2	78.2	0.17	1.26	.134	.033	<.001	.167
150	Northern Pike	24.4	76.9	0.48	4.02	.151	.033	<.001	.184
173	Northern Pike	23.8	74.9	1.10	2.68	.208	.044	<.001	.252
174	Northern Pike	23.5	76.5	0.26	2.39	.212	.051	<.001	.263
175	Northern Pike	25.6	75.4	0.13	3.25	.277	.053	<.001	.330
176	Northern Pike	33.0	75.1	1.55	4.83	.265	.047	.006	.318
	Average				3.07	.208	.044	.002	.252
151	Sauger	10.3	77.2	0.92	3.08	.243	.100	<.001	.343
167	Sauger	12.0	74.1	1.63	2.07	.176	.049	<.001	.225
	Average				2.58	.210	.075	<.001	.284
152	Carp	21.2	66.4	11.6	3.29	.463	.358	<.001	.821
153	Carp	21.0	73.1	5.03	2.79	.227	.117	<.001	.344
154	Carp	18.0	68.7	8.49	1.95	.157	.083	<.001	.240
155	Carp	15.2	72.5	4.61	2.93	.240	.100	<.001	.340
156	Carp	18.7	69.8	9.60	4.05	.163	.108	<.001	.271
157	Carp	19.3	67.6	10.3	2.60	.217	.108	<.001	.325
	Average				2.94	.244	.146	<.001	.390
158	Largemouth Bass	13.2	75.7	2.28	1.84	.229	.125	<.001	.354
168	Largemouth Bass	15.0	72.0	2.53	1.93	.202	.046	.003	.251
169	Largemouth Bass	15.2	73.7	1.75	3.21	.282	.089	.010	.381
170	Largemouth Bass	13.7	74.5	0.14	4.24	.339	.049	.002	.390
171	Largemouth Bass	14.8	73.6	1.78	3.02	.203	.040	.004	.247
172	Largemouth Bass	14.0	72.6	2.44	1.49	.284	.051	.002	.337
	Average				2.62	.256	.067	.004	.327

Sample Number	Species	Length (Inches)	%HOH	%FAT	PCB	DDE	DDD	DDT	Total DDT
159	Northern Redhorse	15.2	74.8	0.49	2.81	.254	.108	<.001	.362
160	Northern Redhorse	14.5	69.8	5.91	3.21	.289	.100	<.001	.389
161	Silver Redhorse	15.7	75.0	0.61	1.55	.176	.041	.005	.222
162	Silver Redhorse	21.5	72.7	2.85	3.10	.352	.035	.003	.390
163	Silver Redhorse	21.5	73.8	2.02	2.69	.295	.041	.006	.342
	Average				2.67	.273	.065	.003	.341
164	Walleye	12.8	74.1	1.91	1.52	.095	.023	.003	.121
165	Walleye	15.6	70.0	7.15	4.17	.248	.024	.003	.275
166	Walleye	12.9	73.0	2.58	3.05	.186	.026	.006	.218
	Average				2.91	.176	.024	.004	.205

TABLE 2. CHLORINATED HYDROCARBON RESIDUE IN LAKE MICHIGAN FISH (FALL, 1974 - SPRING, 1975)

STATION:ALGOMA, WISCONSIN - FALL, 1974

Sample Number	Species	Length (Inches)	Weight (Lbs.)	%HOH	%FAT	PCB	DDE	DDD	DDT	Total DDT	Dieldrin
6	Chinook Salmon	36.0	15.5	78.2	0.94	15.0	7.02	.459	.985	8.46	.001
85	Coho Salmon	16.4	11.5	74.8	2.72	1.85	.473	.060	.072	.605	.010
30	Coho Salmon	18.3	2.1	75.2	4.11	.29	.045	.155	.029	.229	.076
12	Coho Salmon	17.8	2.2	75.2	2.03	3.95	1.10	.181	.171	1.45	.005
84	Coho Salmon	18.5	2.4	73.1	3.60	3.75	.699	.116	.147	.962	.032
34	Coho Salmon	19.6	2.8	74.8	3.55	3.90	1.17	.178	.140	1.49	.080
	Average					2.74	.697	.138	.140	1.25	.057
82	Coho Salmon	22.1	3.2	74.9	2.18	5.27	1.56	.166	.216	1.94	.049
11	Coho Salmon	23.5	3.3	76.9	1.44	7.84	2.62	.190	.092	2.90	.012
32	Coho Salmon	20.5	3.4	72.7	4.46	6.21	1.55	.200	.311	2.06	.105
81	Coho Salmon	22.1	3.7	71.6	5.56	7.60	1.82	.198	.281	2.30	.080
80	Coho Salmon	23.3	3.8	72.8	3.87	4.92	1.88	.162	.250	2.29	.059
	Average					6.37	1.87	.183	.230	2.30	.061
79	Coho Salmon	23.7	4.0	74.0	3.37	6.17	2.08	.159	.221	2.46	.061
33	Coho Salmon	25.3	5.6	74.6	2.26	2.05	.802	.126	.132	1.06	.064
10	Coho Salmon	27.0	6.8	71.1	2.99	6.81	2.33	.214	.144	2.69	.025
9	Coho Salmon	30.3	9.5	70.7	5.70	6.64	3.43	.245	.197	3.87	.025
96	Coho Salmon	31.2	10.7	73.1	3.84	8.82	1.96	.181	.274	2.42	.097
8	Coho Salmon	31.0	11.4	73.2	4.05	6.61	4.08	.277	.462	4.82	<.001
7	Coho Salmon	32.8	12.3	75.2	3.23	10.5	5.87	4.03	.701	6.97	<.001
	Average					6.80	2.94	.747	.304	3.47	.039
31	Brown Trout	20.9	5.4	72.7	4.33	5.34	1.68	.186	.162	2.03	.138
83	Tiger Trout	17.5	2.1	74.9	4.53	4.88	.910	.134	.129	1.17	.054

STATION:LAKE MICHIGAN - FALL, 1974

25	Brown Trout	20.0	4.2	61.7	18.8	1.59	.657	.210	.112	.979	.135
73	Lake Trout	16.1	1.4	71.3	9.33	2.07	.495	.099	.137	.731	.099
70	Lake Trout	16.3	1.4	73.8	6.30	2.50	.561	.116	.163	.840	.075
71	Lake Trout	17.3	1.5	73.8	6.62	3.10	.676	.122	.208	1.01	.116
	Average					2.56	.577	.112	.169	.860	.097
48	Lake Trout	19.3	2.1	66.9	12.2	4.81	1.34	.158	.216	1.71	.181
72	Lake Trout	20.3	2.4	71.3	9.19	2.56	.566	.137	.236	.939	.131
47	Lake Trout	20.8	2.4	69.5	9.42	4.36	1.67	.150	.208	2.03	.172
50	Lake Trout	19.1	2.6	66.9	12.8	6.84	2.04	.175	.435	.265	.238
49	Lake Trout	20.7	2.8	67.0	13.4	4.23	1.37	.130	.178	1.68	.185
	Average					4.56	1.40	.150	.255	1.80	.181

Sample Number	Species	Length (Inches)	Weight (Lbs.)	%HOH	%FAT	PCB	DDE	DDD	DDT	Total DDT	Dieldrin
74	Lake Trout	25.0	5.4	60.3	20.5	11.8	2.73	.224	.357	3.31	.184
86	Lake Trout	25.8	5.7	58.9	19.9	9.35	2.43	.283	.476	3.19	.272
87	Lake Trout	25.4	5.8	64.1	16.5	25.0	6.92	.663	1.06	8.64	.360
	Average					15.4	4.03	.390	.631	5.05	.272
88	Lake Trout	26.5	6.0	61.3	18.5	27.0	7.80	.678	1.29	9.77	.365
45	Lake Trout	26.2	6.3	52.4	22.1	8.77	2.89	.264	.43	3.58	.253
41	Lake Trout	27.0	6.4	68.6	10.6	26.7	10.2	.308	1.44	12.0	.037
43	Lake Trout	27.4	6.6	61.6	19.3	11.3	4.99	.259	.465	5.71	.207
46	Lake Trout	26.6	6.9	60.7	18.8	10.8	4.09	.223	.588	4.90	.242
	Average					16.9	5.99	.346	.843	7.19	.221
44	Lake Trout	27.2	7.0	60.2	19.7	12.6	5.17	.020	.630	5.82	.247
42	Lake Trout	26.3	7.1	60.7	18.4	8.29	3.58	.225	.409	4.21	.193
91	Lake Trout	27.6	7.8	59.4	21.8	28.1	9.34	.800	1.25	11.4	.451
95	Lake Trout	27.7	7.8	64.9	15.6	34.4	11.1	.911	1.83	13.8	.323
	Average					20.8	7.30	.489	1.03	8.81	.304
92	Lake Trout	27.7	8.0	66.0	14.1	19.5	5.57	.595	1.10	7.27	.324
89	Lake Trout	28.7	8.1	65.6	14.3	41.9	11.1	1.30	2.18	14.6	.338
93	Lake Trout	28.3	8.2	57.7	22.8	37.2	10.1	.952	1.79	12.8	.505
90	Lake Trout	29.1	8.5	63.6	16.4	35.9	12.0	1.06	2.16	15.2	.440
39	Lake Trout	29.9	8.8	72.1	9.94	31.3	11.7	.729	2.11	14.5	.186
	Average					33.2	10.1	.927	1.87	12.9	.359
40	Lake Trout	29.5	9.5	72.4	7.87	11.0	4.92	.305	1.01	6.24	.156
94	Lake Trout	29.8	9.9	59.7	20.3	43.8	14.0	.954	2.08	17.0	.402
	Average					27.4	9.46	.630	1.54	11.6	.279
	STATION: STRAWBERRY CREEK - FALL, 1974										
38	Chinook Salmon	17.9	2.2	74.0	3.14	1.83	.538	.098	.080	.716	.053
78	Chinook Salmon	23.5	4.5	75.8	1.71	9.24	2.05	.219	.325	2.59	.054
37	Chinook Salmon	22.9	4.9	73.1	2.29	7.19	2.29	.216	.320	2.83	.038
77	Chinook Salmon	25.4	5.4	73.2	2.84	8.63	2.11	.263	.380	2.75	.094
36	Chinook Salmon	27.8	7.9	75.4	2.01	5.39	1.32	.201	.321	1.84	.100
35	Chinook Salmon	32.8	12.7	75.2	2.52	7.58	3.59	.233	.287	4.11	.069
4	Chinook Salmon	33.2	14.1	75.0	2.89	12.8	5.53	.450	.730	6.71	<.001
97	Chinook Salmon	32.0	14.8	76.2	1.33	10.1	3.48	.246	.393	4.12	.064
5	Chinook Salmon	35.0	15.3	76.7	1.67	12.7	6.28	.290	.470	7.04	<.001
3	Chinook Salmon	36.4	18.0	77.1	1.65	14.2	7.49	.340	.450	8.28	<.001
2	Chinook Salmon	36.8	18.3	75.7	3.88	9.92	6.40	.390	1.93	8.72	<.001
1	Chinook Salmon	37.3	21.4	75.7	3.06	17.0	8.07	.500	1.04	9.61	<.001
	Average					9.72	4.10	.287	.560	4.94	.040
76	Coho Salmon	18.8	1.8	75.0	2.59	2.25	.432	.128	.169	.729	.056

Sample Number	Species	Length (Inches)	Weight (Lbs.)	%HOH	%FAT	PCB	DDE	DDD	DDT	Total DDT	Dieldrin
		STATION:KEWAUNEE POWER PLANT - FALL, 1974									
15	Rainbow Trout	23.3	4.4	69.5	8.58	3.40	1.11	.201	.157	1.47	<.001
19	Brown Trout	11.1	0.6	68.2	11.4	2.50	.670	.116	.152	.938	.012
20	Brown Trout	11.1	0.6	71.3	9.04	2.13	.541	.118	.124	.783	<.001
75	Brown Trout	15.6	1.8	65.0	13.5	2.67	.572	.128	.179	.879	.109
22	Brown Trout	16.5	2.0	70.0	7.79	5.03	.760	.193	.167	1.12	<.001
17	Brown Trout	16.4	2.0	57.5	18.1	4.87	.893	.194	.254	1.34	.078
21	Brown Trout	17.0	2.2	65.6	13.3	2.02	.724	.167	.156	1.05	.001
18	Brown Trout	16.4	2.4	62.9	16.1	2.53	.747	.151	.205	1.10	.021
16	Brown Trout	16.3	2.5	61.9	17.1	2.64	.891	.169	.176	1.24	<.001
14	Brown Trout	22.3	5.8	62.9	16.3	4.21	1.11	.222	.231	1.56	<.001
13	Brown Trout	30.5	8.9	72.4	6.63	8.36	2.47	.278	.293	3.04	<.001
	Average					3.70	.938	.174	.194	1.30	.022
		STATION:BAILEY'S HARBOR - FALL, 1974									
26	Brown Trout	16.1	2.1	69.0	10.8	1.57	.646	.111	.102	.859	.023
23	Brown Trout	19.5	4.5	56.8	17.8	4.76	1.00	.204	.185	1.39	.108
24	Brown Trout	22.6	7.1	61.2	17.0	6.63	1.73	.240	.253	2.22	.235
	Average					4.32	1.12	.185	.180	1.49	.122
		STATION:60' OFF STURGEON BAY - FALL, 1974									
28	Brown Trout	21.0	4.5	76.3	4.38	6.91	3.19	.198	.391	.378	.106
51	Lake Trout	16.6	1.5	69.3	10.2	4.32	1.20	.145	.190	1.54	.203
29	Lake Trout	17.2	1.8	72.1	8.46	3.53	1.44	.100	.152	1.69	.046
27	Lake Trout	29.6	8.0	66.4	14.0	25.5	8.31	.775	1.76	10.8	.255
	Average					11.1	3.65	.340	.701	4.68	.168
		STATION:CHAMBER ISLAND - SPRING, 1975									
66	Whitefish	14.0	1 - 2	68.3	11.8	1.67	.267	.030	.051	.348	.190
67	Whitefish	14.0	1 - 2	67.8	12.1	1.35	.272	.040	.055	.367	.168
68	Whitefish	14.0	1 - 2	68.5	11.8	1.69	.202	.045	.024	.271	.138
69	Whitefish	14.0	1 - 2	66.4	13.4	1.97	.257	.042	.036	.335	.182
	Average					1.67	.250	.039	.042	.330	.170
		STATION:4 MILES SOUTH OF CHAMBERS ISLAND - SPRING, 1975									
54	Whitefish	22.3	3.6	67.2	12.8	2.19	.556	.077	.109	.752	.172
55	Whitefish	22.9	4.3	63.4	17.6	3.89	.456	.078	.035	.569	.118
52	Whitefish	26.2	7.0	52.8	26.0	15.2	2.02	.417	.430	2.87	.278
53	Whitefish	28.7	9.4	56.8	25.3	10.7	1.69	.320	.043	2.05	.256
	Average					8.00	1.18	.223	.154	1.56	.206

Sample Number	Species	Length (Inches)	Weight (Lbs.)	%HOH	%FAT	PCB	DDE	DDD	DDT	Total DDT	Dieldrin
	STATION:5 MILES SOUTH OF CHAMBERS ISLAND - SPRING, 1975										
56	Whitefish	17.3	2.3	61.4	19.2	2.04	.454	.033	.036	.523	.283
57	Whitefish	18.1	2.3	65.5	14.3	2.25	.403	.046	.036	.485	.243
59	Whitefish	23.9	5.5	58.5	21.8	5.32	.987	.106	.163	1.26	.358
58	Whitefish	23.7	6.8	56.4	24.1	7.05	.814	.200	.091	1.11	.294
	Average					4.16	.664	.096	.082	.844	.294
	STATION:7 MILES SOUTH OF CHAMBERS ISLAND - SPRING, 1975										
61	Whitefish	16.9	1.8	68.1	11.0	1.76	.247	.046	.042	.335	.153
60	Whitefish	17.3	2.0	66.4	13.8	1.45	.342	.029	.056	.427	.236
62	Whitefish	17.7	2.3	64.4	15.6	2.57	.400	.054	.042	.496	.311
63	Whitefish	20.0	3.1	66.5	15.4	3.42	.559	.089	.111	.759	.279
64	Whitefish	23.4	4.8	61.4	19.8	4.24	.750	.104	.137	.991	.350
65	Whitefish	26.4	7.1	61.7	20.1	9.55	.761	.165	.160	1.09	.372
	Average					3.83	.509	.081	.091	.683	.784
	STATION:LITTLE STURGEON BAY, GREEN BAY, GRID 803 - SPRING, 1975										
100	Carp	26.7	8.5	55.4	23.8	5.52	.505	.186	.033	.724	.213
98	Carp	25.5	9.5	60.9	16.1	14.5	1.00	.250	.006	1.26	.139
102	Carp	25.5	10.0	56.4	24.4	24.2	.893	.159	.012	1.06	.109
103	Carp	26.5	10.1	57.9	22.3	15.5	1.13	.101	.012	2.16	.077
99	Carp	25.4	11.0	58.4	20.4	8.00	.629	.284	.068	.981	.188
101	Carp	27.8	12.0	55.0	24.8	36.5	2.01	.245	.020	2.28	.089
104	Carp	29.3	13.0	54.5	26.4	51.6	1.34	.117	.010	1.47	.070
	Average					22.3	1.07	.192	.023	1.42	.126

TABLE 3. CHLORINATED HYDROCARBON RESIDUES IN LAKE WISCONSIN FISH (WINTER, 1974)

Sample Number	Species	Length (Inches)	Weight (Lbs.)	Sex	%HOH	%FAT	PCB PPM	Hg mg Hg/Kg Sample
9	Carp	25.5	8.0	F	69.9	9.63	2.61	.23
10	Carp	27.0	8.2	M	72.5	6.48	1.60	.31
6	Carp	27.0	10.0	M	71.9	9.27	1.86	.35
8	Carp	28.0	10.2	F	69.8	9.59	3.01	.46
5	Carp	29.0	11.0	M	74.7	3.14	1.39	.54
7	Carp	29.0	11.0	F	72.0	7.66	1.83	.43
4	Carp	29.0	13.0	M	72.4	7.86	1.71	.43
3	Carp	30.0	18.0	F	64.4	15.9	4.37	.58
1	Carp	34.5	22.0	F	76.3	2.74	1.21	.52
2	Carp	36.5	26.5	F	63.8	18.2	4.73	.43
	Average						2.43	.43
13	Buffalo	23.7	7.0	-	68.6	12.9	3.19	.62
19	Buffalo	24.5	9.2	M	60.8	26.6	8.04	.48
12	Buffalo	24.0	9.8	F	58.0	18.8	8.99	.55
16	Buffalo	25.2	9.8	M	62.2	18.4	4.85	.52
14	Buffalo	26.2	10.2	-	61.6	19.0	5.83	.54
15	Buffalo	27.0	10.8	F	67.6	11.8	3.70	.68
11	Buffalo	25.2	11.5	-	64.2	16.9	3.13	.44
20	Buffalo	28.0	14.5	F	57.4	20.3	5.21	.57
18	Buffalo	29.0	19.5	F	71.7	8.5	4.06	.42
17	Buffalo	31.0	23.5	F	56.1	21.4	4.37	.32
	Average						5.14	.51

TABLE 4. CHLORINATED HYDROCARBON RESIDUE IN LAKE WINNEBAGO SHEEPSHEAD (Aplodinotus grunniens) 1974

Sample Number	Sample Size	Length Range (Inches)	%HOH	%FAT	PCB	DDE	DDD	DDT	Total DDT	Dieldrin
36	3	5 - 8	66.2	14.2	.330	.042	.025	.004	.071	.025
44	3	8½ - 11	66.9	12.7	.230	.029	.015	.005	.049	.007
42	3	10 - 12	66.2	13.0	.202	.034	.022	.003	.059	.024
38	3	12	66.8	12.1	.373	.049	.018	.001	.067	.021
40	3	12	66.5	12.0	.174	.030	.016	.002	.048	.021
37	3	12 - 14	63.2	16.3	.409	.060	.039	.008	.107	.033
45	3	12 - 14½	64.6	15.0	.327	.020	.030	.021	.071	.036
43	3	13 - 15	65.8	12.9	.345	.010	.026	.012	.058	.041
39	3	15	71.1	6.43	.201	.028	.019	.005	.052	.017
41	2	16	65.7	14.1	.275	.056	.030	.008	.094	.025
	Average				.284	.036	.024	.007	.068	.025

TABLE 5. CHLORINATED HYDROCARBON RESIDUE IN UPPER FOX RIVER FISH (SPRING, 1975)

STATION:GRAND RIVER LOCK S22, T15N, R10E

Sample Number	Species	Length (Inches)	%HOH	%FAT	PCB	DDE	DDD	DDT	Total DDT	Dieldrin
31	Dogfish	19.0	76.6	0.73	1.20	.025	.009	.003	.037	.002
24	Dogfish	21.0	74.1	3.11	1.80	.013	.012	.003	.028	.014
	Average				1.50	.019	.010	.003	.032	.008
25	Sucker	14.0	73.1	4.21	.453	.015	.011	.001	.027	.008
26	Largemouth Bass	10.5	72.5	3.00	6.73	.045	.022	.001	.067	.011
27	Northern Pike	26.0	75.8	0.10	.871	.039	.013	.007	.059	.002
32	Sheepshead	17.0	78.7	0.15	.399	.029	<.001	.001	.030	.001
34	Carp	13.0	75.6	1.57	.813	.030	.022	.003	.055	.010
29	Carp	14.3	72.8	4.34	.877	.027	.019	<.001	.046	.012
28	Carp	15.8	72.3	4.66	.520	.017	.021	<.001	.038	.016
33	Carp	15.8	71.5	4.98	1.56	.040	.026	.001	.067	.016
30	Carp	15.9	72.4	3.88	1.02	.037	.066	.003	.106	.012
35	Carp	17.0	68.4	9.15	2.07	.047	.031	.001	.079	.032
	Average				1.14	.033	.031	.002	.065	.016

STATION:EUREKA DAM S30, T18N, R14E

15	Largemouth Bass	12.2	73.1	2.75	.270	.018	.014	<.001	.032	.012
13	White Sucker	13.2	71.5	5.54	.393	.024	.009	.005	.038	.007
22	Northern Pike	13.3	74.5	2.57	<0.10	.024	.017	.001	.042	.007
23	Carp	12.5	73.6	4.34	.114	.012	.013	<.001	.025	.012
16	Carp	16.0	68.6	8.83	.568	.025	.025	<.001	.050	.026
17	Carp	17.5	68.1	9.60	.487	.022	.032	<.001	.054	.020
19	Carp	19.0	73.0	4.74	.322	.013	.016	<.001	.029	.008
14	Carp	19.0	66.6	10.8	.787	.069	.032	<.001	.101	.025
12	Carp	21.5	70.2	8.09	1.79	.087	.029	<.001	.116	.014
	Average				.678	.038	.024	<.001	.062	.018
20	Redhorse	12.0	74.7	1.69	.219	.009	.006	.001	.016	.004
21	Redhorse	13.0	71.7	5.10	.781	.035	.008	.003	.046	.008
18	Redhorse	16.8	69.8	6.45	.562	.017	.009	.007	.033	.010
	Average				.521	.020	.008	.004	.032	.007

STATION: COUNTY TRUNK "O" BRIDGE S23, T14N, R7E

Sample Number	Species	Length (Inches)	%HOH	%FAT	PCB	DDE	DDD	DDT	Total DDT	Dieldrin
7	White Sucker	14.2	72.1	6.90	32.7	.083	.064	.032	.179	.054
6	Northern Pike	11.8	75.5	1.91	13.2	.027	.018	.004	.049	.018
1	Northern Pike	18.5	74.6	2.30	17.6	.055	.028	.011	.094	.023
	Average				15.4	.041	.023	.008	.072	.020
8	Carp	14.0	69.2	9.32	45.8	.096	.106	.003	.205	.053
3	Carp	16.0	63.4	14.2	35.3	.082	.069	<.001	.151	.076
2	Carp	19.0	65.9	12.2	21.4	.051	.067	.004	.122	.067
4	Carp	22.0	65.6	13.5	34.1	.068	.080	.003	.151	.066
11	Carp	22.0	63.1	16.4	39.4	.064	.065	<.001	.129	.075
10	Carp	23.0	68.4	8.00	42.0	.048	.038	.001	.086	.060
9	Carp	26.0	67.0	11.8	42.0	.064	.045	.002	.111	.070
5	Carp	26.5	66.7	12.1	26.9	.062	.046	.003	.111	.064
	Average				35.9	.067	.064	.002	.133	.066

TABLE 6. CHLORINATED HYDROCARBON RESIDUE IN ROCK RIVER BUFFALO FISH (*Ictiobus sp.*), SPRING, 1975

Sample Number	Length (Inches)	Weight (Lbs.)	Sex	PCB	Dieldrin	DDE	DDD	DDT
11	30	16	F	2.35	.030	3.27	.225	.278
12	28	13	F	1.74	.025	3.68	.253	.203
13	24	6½	F	3.33	.050	4.34	.325	.407
14	28	13½	F	1.63	.030	3.93	.161	.203
15	25	8½	F	2.27	.035	3.85	.266	.305
16	24	7	M	4.28	.047	3.12	.326	.239
17	25	9	F	5.36	.065	4.02	.336	.402
18	24	6	M	2.86	.039	3.39	.282	.380
19	24	7	M	2.49	.052	3.92	.277	.322
20	23	7	F	3.30	.060	2.42	.250	.086

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Dist.: List 2 + Opt.
Area Supervisors
Betty Les - 150
Dist. Staff Specs.-Fish
Fish Managers & Biologists
Fish Mgt. Staff